Tennessee Technological University
Mathematics Department

MATH 1420: Geometry Concepts for Teachers

I. COURSE DESCRIPTION FROM CATALOG:

Introduction to elements of probability and statistics, basic concepts of Euclidean geometry including congruence, similarity, measurements, areas and volumes. Lecture 3. Credit 3.

II. PREREQUISITE(S):

C or better in MATH 1410. **Admission is restricted to students majoring in Elementary Education.**

III. COURSE OBJECTIVE(S):

Build on (not replicate) the competencies gained through the study of two years of high school algebra and one year of high school geometry. Use mathematics to solve problems and determine if the solutions are reasonable. Use mathematics to model real world behaviors and apply mathematical concepts to the solution of real-life problems. Make meaningful connections between mathematics and other disciplines. Use technology for mathematical reasoning and problem solving. Apply mathematical and/or basic statistical reasoning to analyze data and graphs.

1. Introduce inductive reasoning and help develop problem solving strategies;
2. Promote an understanding of elementary statistics and probability;
3. Review the basics of plane geometry along with some solid geometry;
4. Develop and understanding of constructions, congruence and similarity, and,
5. Cover the basic concepts of measurements and introduce coordinate geometry.

IV. STUDENT LEARNING OUTCOMES:

Upon successful completion of the course the student will be able to: demonstrate familiarity with terminology related to relations and functions and various graph-theoretic properties concerning relations and functions; demonstrate the ability to solve various algebraic equations, including systems of equations, and inequalities, both algebraically and graphically; demonstrate an understanding of basic probability and statistics; determine basic geometrical properties such as volume, area, congruence, and similarity of various objects in Euclidean geometry; demonstrate familiarity with different systems of measurement and have the ability to convert from one type of unit in a measurement system to the corresponding type in a different system. This course addresses the needs of prospective elementary and middle school teachers to understand and explain these skills in an elementary and middle school environment.

V. TOPICS TO BE COVERED:

- Algebra Review
    - Define a variable
    - Simplifying an expression
    - Properties of equality
    - Solving an equation
        - Solve simple equations using the reverse of the order of operations

        - Use the distributive property and properties of equality to solve simple equations
        - Solve equations with multiple solutions (quadratics)
    - Functions
        - Sequences
        - Series
        - Linear Functions
- Geometry
    - Definitions and properties of plane geometry
    - Properties of polygons
    - Properties of angles in a plane
    - Definitions and properties in three-dimensional geometry
    - Congruence, similarity, and constructions (Show how the three are connected.)
    - Right triangle trigonometry (optional)
    - Coordinate geometry (optional)
    - Motion geometry (Transformations in the plane)
- Measurement
    - Linear measurement
        - Units of measurement and conversion factors
        - Perimeter
        - Circumference and Arc length (Derive the formulas)
    - Area
        - Units of measurement and conversion factors
        - Counting area (Geoboard)
        - Area of rectangles and squares
        - Area of parallelogram (Derive the formula)
        - Area of triangle (Derive the formula)
        - Area of trapezoid (Derive the formula)
        - Area of any polygon (Derive the formula for regular polygons)
        - Area of circle and sector (Derive the formulas)
    - Measurement for three-dimensional objects
        - Surface area (cylinders, prisms, pyramids, spheres – derive the formulas)
        - Volume (cylinders, prisms, pyramids, spheres – derive the formulas)
- Probability
    - Definitions
    - Relative frequency
    - Theoretical probability
        - Geometric probability
        - Single-stage experiments
        - Multi-stage experiments
- Statistics
    - Collection of data
    - Calculations
        - Mean
        - Standard deviation
        - Median

        - Quartiles and Percentiles
        - Inter-quartile Range
    - Graphical Analysis
        - Histograms
        - Stem-and-Leaf Plot
        - Box-and-Whisker Plot
        - Normal Distribution

VI. ADDITIONAL INFORMATION:

These courses may be used to satisfy the minimum general education requirements in mathematics.

VII. POSSIBLE TEXTS AND REFERENCES:

A Problem Solving Approach to Mathematics, 12th ed., Billstein, Libeskind, and Lott

VIII. ANY TECHNOLOGY THAT MAY BE USED:

Geometer's SketchPad

IX. STUDENT ACADEMIC MISCONDUCT POLICY:

Maintaining high standards of academic integrity in every class at Tennessee Tech is critical to the reputation of Tennessee Tech, its students, alumni, and the employers of Tennessee Tech graduates. The Student Academic Misconduct Policy describes the definitions of academic misconduct and policies and procedures for addressing Academic Misconduct at Tennessee Tech. For details, view the Tennessee Tech's Policy 217 – Student Academic Misconduct at Policy Central.

X. DISABILITY ACCOMMODATION:

Students with a disability requiring accommodations should contact the Office of Disability Services (ODS). An Accommodation Request (AR) should be completed as soon as possible, preferably by the end of the first week of the course. The ODS is located in the Roaden University Center, Room 112; phone 372-6119. For details, view the Tennessee Tech's Policy 340 – Services for Students with Disabilities at Policy Central.